UCRL-JC-125632 Abs

A Stacked-DRAM Solid State Recorder Using a Novel Laser Patterned 3-D Interconnect Process†

by

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Abstract: A new process is described for producing metal traces on three dimensional surfaces. The process, known as Laser Pantography (LP), makes use of a laser to expose a photoresist which is conformally plated onto a thin metal seed layer that covers the various surfaces. Copper is plated onto the seed layer which is exposed after resist development. Finally, the residual resist and seed layer are removed to leave the plated metal traces. The process produces rugged, reliable interconnects and is sufficiently simple to be applied to high density 3D packaging for consumer electronics.

LP interconnect can be used for chip to board or chip to chip interconnect. LP interconnect has the advantage of low inductance compared to wire bonding and can also be configured as coplanar transmission line interconnect for RF applications. Data is presented on the speed of LP interconnect compared to wire bonded connections from a chip to a board.

Laser Pantography has been used to fabricate DRAM memory cubes. Pads on DRAM chips are rerouted to one side of those chips. The chips are stacked and connected to flex tape by an anisotropically conducting adhesive (ACA) using a gang-bonding technique. The flex tape has metal lines on one side and the sidewall pads are arranged in such a way that address and enable lines on the chips in the stack are bussed while each data line on each chip is connected to a unique line on the flex. The other side of the flex is bonded to the circuit board using the ACA. Six DRAM cubes have been tested in a 1 GB solid state flight recorder.

This work was performed under the auspices of the U.S. DOE by LLNL under contract no. W-7405-Eng-48.

† prepared for submittal to ECTC - subcommittee on *Multichip Packaging* or *Interconnects*

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